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AUTHOR Caffarella, Edward P.; Fly, Kenneth
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ABSTRACT

The purpose of this study was to test the feasibility of using a model adapted from the instructional design and technology (ID&T) taxonomy model proposed by the Association for Educational Communications and Technology (AECT) Definitions and Terminology Committee to build an ID&T knowledge base. The model was tested by mapping a random sample of 152 ID&T dissertations into the three-dimensional model. (The major side of the model is divided into four areas: design, delivery, evaluation, and management. The second side divides each of these four major areas into sub-areas such as instructional design and learning theory. The third side is divided into three types of knowledge theory: research, theory, and philosophy.) Each of the selected dissertations was assigned to a specific cell within the model by two evaluators. Every cell on the research plane, except formative evaluation, had at least one dissertation; only three were mapped into the theory and philosophy planes. Two new cells were added to the original model in the process of mapping, General Delivery and Personnel Management, and four dissertations (3% of the sample) did not fit into any of the cells in the model. The only cell that showed a major increase in the percentage of dissertations from 1977 to 1988 was electronic technology. It was concluded that the model is a reasonable representation of the ID&T knowledge base, and it is suggested that articles from prominent journals should also be mapped to test the validity of the model and to better define the knowledge base for the field. (7 references) (BBM)

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Authors:

Edward P. Caffarella
Kenneth Fly

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Developing a Knowledge Base and Taxonomy
in Instructional Technology

Edward P. Caffarella
Kenneth Fly
University of Northern Colorado

The research reported in this paper is the result of a preliminary investigation and development of a knowledge base for the field of Instructional Design and Technology (ID&T). A knowledge base provides the theoretical and research underpinnings for the field. The development of this knowledge base is important for the education of ID&T specialists and the definition of the field.

Description of the Taxonomy

The knowledge base model is adapted from the ID&T taxonomy model proposed by the Association for Educational Communications and Technology (AECT) Definitions and Terminology Committee. The taxonomy is a three dimensional model as shown in figure 1.

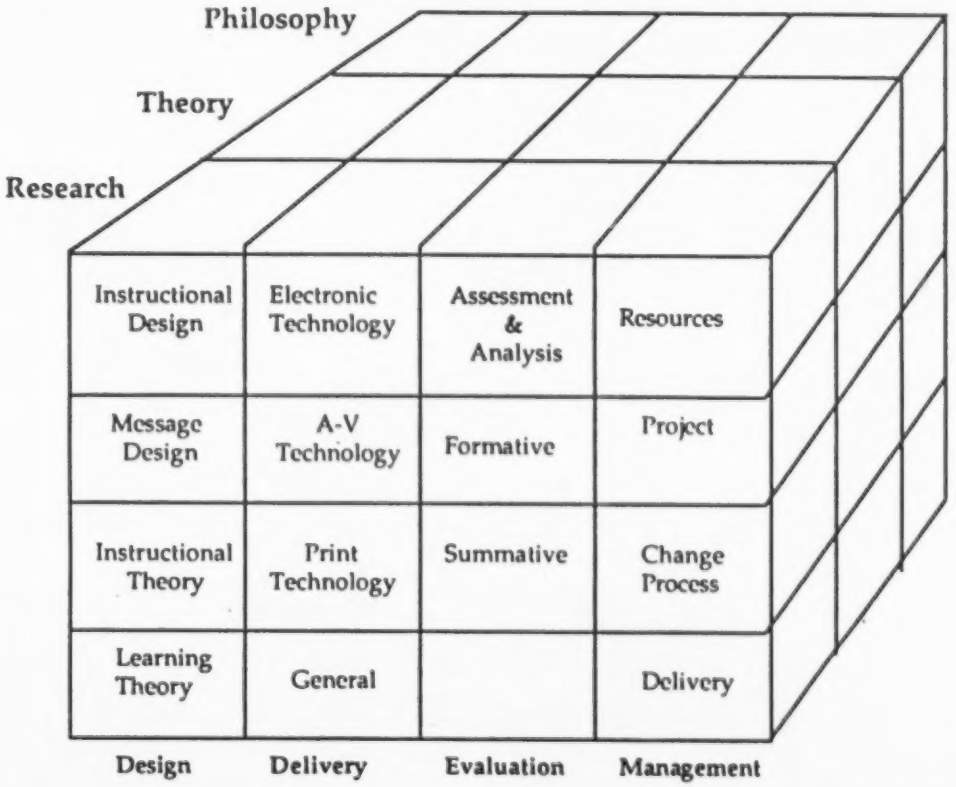

Figure 1: Taxonomy for Instructional Design and Technology as proposed by the Association for Educational Communications and Technology Definitions and Terminology Committee, 1991.

The major side of the model is divided into four areas: 1) design, 2) delivery, 3) evaluation, and 4) management. The second side divides each of these four major areas into subareas such as instructional design and learning theory. The third side is divided into three types of knowledge namely: 1) research, 2) theory, and 3) philosophy.

The purpose of this study was to test the feasibility of using the model to build an ID&T knowledge base. The feasibility was tested by mapping doctoral dissertations into the model.

Background

Practitioners in the field of instructional technology are faced with the task of defining the purpose and role of a dynamic and emerging field of scientific thought. To complete this task they must establish a means for organizing and identifying the relationships emerging from research, theory, and philosophical studies. Given the intricate and complex relationship among factors such as learner characteristics, task, technology, and instructional design, the effort to organize numerous functional categories of interest and information can be overwhelming.

The use of taxonomies and classifications to aid in simplifying these relationships has been widely used with small knowledge bases, especially in computer aided education (Carrier & Sales, 1987; Kozma & Bangert-Drowns, 1987; Knezek, Rachlin, & Scannell, 1988). There have not been any attempts to develop a taxonomy that encompasses the entire field of instructional technology.

This lack of a common framework can lead to the use of "fuzzy" or multiple definitions for the same idea, making generalizations across sub-fields difficult. Thus, the development of a taxonomy, or common knowledge base, is important to the future development of the field of instructional technology. This paper addresses the validity and usefulness of a taxonomic structure proposed by the Association for Educational Communications and Technology (AECT) Definitions and Terminology Committee.

The origin of classification schemes or taxonomies to organize human knowledge bases dates back to the Greeks, and even to primitive man (Sokal, 1974). The purpose of developing classification schemes is to achieve economy of memory, and ultimately to describe the structure and relationship of the items to each other and to similar objects. This classification structure aids in simplifying relationships in such a way that

general statements can be made about classes of objects. (Sokal, 1974).

Fleishman & Quaintance (1984) identified several potential benefits for developing a taxonomy of human performance that have direct relevance to the field of instructional technology.

1. To aid in conducting literature reviews. Instructional technologists looking for literature on a particular problem often have difficulty identifying appropriate research descriptors for their search (e.g. instructional technology versus educational technology).

2. Create the ability to generalize to new tasks. In the case of instructional technology, the rapidity of technological change necessitates the ability to transfer what is known from one technology to another. Without this transferability the research base must be recreated for each new technological innovation.

3. Exposing gaps in knowledge by delineating categories and subcategories on knowledge, exposing holes in research or theory.

4. Assisting in theory development by evaluating how successfully theory organizes the observational data generated by research within the field of instructional technology.

Methodology

The model was tested by mapping ID&T dissertations into the three dimensional model. The dissertation titles covered the years 1977 through 1988 and were taken from existing lists of ID&T doctoral dissertations (Caffarella & Sachs, 1988; Caffarella, 1991). These lists contain 1518 dissertations completed at 46 institutions in the United States.

A random sample of 152 dissertations was drawn from these lists. Each of these dissertations was assigned to a specific cell within the model. This classification process was completed independently by two evaluators. When the classifications differed, the evaluators used consensus to determine the appropriate cell.

Results

The results of mapping the dissertations into the model are presented in tables 1 and 2. As shown in the tables, virtually

Table 1
Number and Percentage of Dissertation Titles in Each Cell for the Research Plane

DESIGN	DELIVERY	EVALUATION	MANAGEMENT
Instructional Design 6 titles 4%	Electronic Technology 4 titles 3%	Assessment & Analysis 9 titles 6%	Resource Management 18 titles 12
Message Design 5 titles 3%	AV Technology & Television 13 titles 9%	Formative Evaluation 0 titles 0%	Project Management 4 titles 3%
Instructional Theory 27 titles 18%	Print Technology 6 titles 4%	Summative Evaluation 1 titles 1%	Change Process 15 titles 10%
Learning Theory 30 titles 20%	General Delivery 1 titles 1%		Delivery Management 3 titles 2%
			Personnel Management 3 titles 2%
68 titles 45%	24 titles 17%	10 titles 7%	43 titles 29%

Table 2
Number and Percentage of Dissertation Titles in Selected Cells for the Theory and Philosophy Planes.

Instructional Design -- Theory
1 title 1%
Formative Evaluation -- Theory
1 title 1%
Instructional Design -- Philosophy
1 title 1%

Note: All other cells in the theory and philosophy planes had no title entries.

all of the dissertations were in the research plane with only two dissertations in theory plane and one in philosophy plane. The largest number of dissertations were in the design plane with 45% of the sample. The next largest number was in the management column with 29% followed by delivery with 16% and evaluation with 8%.

The largest number of dissertations in an individual cell was learning theory at 20%. This was followed closely by instructional theory at 18%. The other cells with substantial numbers of dissertations were resource management (12%), change process (10%), and AV technology (including television) (9%).

Every cell on the research plane of the model, except formative evaluation, had at least one dissertation. Only three dissertations were mapped into the theory and philosophy planes. Two new cells were added to the original model in the process of mapping the titles. These cells are "General Delivery" in the delivery plane and "Personnel Management" in the management plane. Four dissertations (3% of the sample) did not fit into any of the cells in the model.

To measure change over time the dissertations were divided into three groups covering the years 1977-1980, 1981-1984, and 1985-1988. The percentage of dissertations in each cell for 1977-1980 were compared against the percentages for 1985-1988. The percentages, as shown in table 3, were relatively equal for the major categories identified above. The only cell with a major increase was electronic technology which rose from no dissertations during the 1977-1980 period to 9% of the total for the 1985-1988 period.

Table 3
Percentage of Dissertations in Major Categories for the Periods 1977-1980 and 1985-1988

Category	1977-1980 Percentage	1985-1988 Percentage
Instructional Theory	19%	18%
Learning Theory	26%	23%
Electronic Technology	0%	9%
AV Technology	5%	7%
Resource Management	7%	11%
Change Process	12%	11%

Conclusions

There are several conclusions from this investigation. First, the model is a reasonable representation of the ID&T knowledge base. Ninety-seven percent of the dissertations fit into an appropriate cell on the model with only four dissertations not fitting the model. Therefore, the model does reflect the doctoral dissertation research that is being conducted in the United States.

The next conclusion is that the ID&T dissertation research has a strong design element. Forty-five percent of the dissertations were in the design plane of the model with 18% in instructional theory and 20% in learning theory. A relatively small percentage (16%) of the dissertations dealt with the delivery of instruction and the hardware components of the field. Thus research in the field is not largely hardware oriented, as

many outsiders believe, but has strong research grounding in the design of instruction, particularly instructional and learning theory.

A substantial number (10%) of the dissertations dealt with the change process. This is not a topic traditionally associated with the ID&T field but is a major factor in the successful introduction of new technologies into educational and training settings. This will likely evolve as an important component of the field in the future.

Virtually all of the dissertations were classified as research with only 2% being classified as either theory or philosophy. This finding is not surprising since theory building and philosophical investigations are usually conducted by experienced scholars in the field. Since this study used doctoral dissertations there were not any experienced scholars in the sample.

The last conclusion parallels the development and availability of microcomputers over the past dozen years. Prior to 1980 there were not any dissertations dealing with electronic technology systems. During the period 1985-1988 dissertations of this topic represented 9% of the total.

Limitations

There are several limitations to the investigation in this study. The dissertations were assigned to the various cells based upon the title of the dissertation. Although dissertation titles tend to be very descriptive, many failed to identify the variables under investigation. The meaning of the specific terms in the titles is also subject to interpretation. Therefore, the use of titles only may have lead to the assignment of some dissertations to improper cells.

The boundaries between the cells are not absolute boundaries and some dissertations could be classified in multiple cells. For example, the boundary between instructional theory and learning theory is not an absolute point and some studies could logically be classified in either or both cells.

Suggestions for Further Investigation

The model should be tested with other scholarly literature from the field of ID&T. Specifically the articles from prominent journals should be mapped to test the validity of the model and to better define the knowledge base for the field. If this mapping proves equally valid then the model should be used to

build a complete knowledge base for the field of instructional design and technology.

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